

REMARKS

Claims

1. Amended claim 1 to
 - clearly define the two-type of orifices, i.e., micro-variable-circular-orifice (4) and conventional multijet-orifices (6), including the locations and compositions;
 - clearly define the two distinguished spray patterns (multijets and hollow conical spray) produced by the above two type orifices;
2. Amended claim 15 and 16 to define the relationship between spray patterns and needle lift magnitudes;
3. Replaced the identifier 'micro-channel' (6) with identifier 'multijet-orifice' for all other claims without adding new matters;

Drawings

1. Redraw Fig. 2 to make a clear identification for multijet-orifice (6) and micro-variable-circular-orifice (4);
2. Redraw Fig. 3 to include views for: (a) needle (1) only; (b) nozzle body (5) only; (c) assembly of nozzle body and needle;
3. Removed Fig. 5, since it has been included in Fig.3 (b);

Description

1. Replaced the identifier micro-channel (6) with identifier multijet-orifice;
2. Made the description for drawing consistent with revisions for drawings;
3. No new matter added;

Response to Claim Objections:

Applicant made presentation through web-teleconference and disclosed the differences in figure 5 of the Lambert vs. the applicant's invention. The applicant gave specific physical meanings of the micro-variable-circular orifice through a three dimensional assembly drawing. The applicant explained that the injector of Lambert cannot produce two different spray patterns of multiple jets and hollow conical spray. Applicant explained that the first needle lift of Lambert can only generate the multijet (spray) flow, but not the hollow conical spray flow as it did in applicant's invention. The applicant and examiners further discussed the mechanism of lifting the needle valve in

applicant's invention while it closes the micro-variable-orifice in order to produce the different spray patterns.

The examiners agreed on with details presented for clam 1, the technical substances were clear and the differences from Lambert's invention were clear.

The examiners made following suggestions which the applicant agreed and were incorporated in this amendment:

- 1. Need clearly define the two-type of orifices, i.e., micro-variable-circular-orifice and conventional multijets orifices or passages, including the locations and compositions;*
- 2. Need clearly define the two distinguished spray patterns (multijets and hollow conical spray) produced by the above two type orifices;*
- 3. Need define the scenarios when flow is passing along one of the above orifices and both of the orifices;*
- 4. Need add figures to illustrate nozzle body along, needle along, and assembly to more clearly illustrate the mirco-variable-circular orifice;*
- 5. Statements in specification can be revised under the condition of without adding new matters to make it more clear;*

The applicant has searched the related patents listed by patent examiner, and fund none of the prior art can give variable spray patterns including a hollow conical spray through a single injector with a single needle valve as defined in the patent application 10/597,000. The applicant believes that the said injector is unique and bears inventions and merits not provided by prior arts, it's applicable for industrial applications.

Respectfully submitted,

/Deyang Hou/

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